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# Applied Science

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## WORK OF THE ONTARIO HYDRO-ELECTRIC POWER COMMISSION

President Gray and the Executive of the Engineering Society are to be congratulated on securing Sir Adam Beck to address a meeting of the Society in Convocation Hall, on Wednesday afternoon, November 18th. On several occasions has Sir Adam previously been approached with a view to having him address a meeting of the Society, but, owing to the many responsible duties devolving upon him, he was unable to heretofore grant our request. The meeting was largely attended, not only by the undergraduate body, but also by the graduates and other members of the Canadian Society of Civil Engineers.

Sir Adam's lecture was exceedingly instructive and interesting, covering the work of the Commission from its inception until the present. He not only outlined what the Commission has done, but explained why it had done it and reviewed the advantages which had resulted to the people of Ontario.

He was followed by Mr. F. A. Gaby, B.A. Sc., '03, Chief Engineer of the Commission, who gave an illustrated description of the construction of the system, its transmission lines and stations.

Honorable W. H. Hearst, Premier of Ontario, spoke briefly. He has always been a warm supporter of the Hydro-Electric scheme, and in referring to Sir Adam Beck and his work he said that apart from the great engineering skill and knowledge required in carrying out such a project, there is another phase which is of vast importance—that of organization—and to Sir Adam must fall the credit for bearing the weight and responsibility of initiating and developing the organization of the greatest co-operative commercial system of its kind in the world.

In his opening remarks Mr. Gray expressed the pleasure of the Society in being so fortunate as to have Sir Adam Beck address us at the first general meeting of the year which had been devoted to engineering work. The first general meeting had been given over to military work and he was glad to report that over 97 per cent. of the undergraduates in engineering are



now participating in military drill, either with the Canadian Officers Training Corps at the University, or with some other regiments. This is a better military showing than is made by any other faculty of any university or college in Canada with the exception of the Royal Military College. He remembered that on one occasion when he was in Berlin, he saw a large sign which read, "We are proud of Adam Beck." To-day the whole



Sir Adam Beck, Chairman, Hydro-Electric Power  
Commission of Ontario

province is proud of him because of the work which he has done in the interests of her people and his worth has received recognition from His Majesty, King George V., who lately honored him with a knighthood.

After the Science Octette rendered a selection Sir Adam gave his address, an extract of which follows:—

"The first thing that I feel like asking myself is, 'Why am



I here?' In answer I can only say that I must have been overawed by the deputation that came to interview me, and in a moment of weakness I yielded. It appears to me that I am about to speak on a subject which is worn almost threadbare; it has been talked of so much that it sounds like ancient history. However, I have promised to give you a practical talk this afternoon on the project, in the accomplishment and achievements of which we take considerable pride.

"The fundamental principle of the whole scheme is really Public Ownership, or the utilization of the resources of the province by the people, for the people, and it originated in the City of Toronto, which fourteen years ago appointed a committee to report as to the feasibility of transmitting electrical energy from Niagara Falls.

"Other municipalities took the matter up and appointed committees to investigate and report. In 1903 the City of Toronto made application to the Legislature for the right to develop and transmit power from Niagara Falls to that city. Deputations waited upon the Government, and on June 12th, 1903, the Legislature passed an Act authorizing any two or more municipalities to appoint commissioners to inquire into, construct and finance works for the development and transmission of electrical energy. Acting under this Act, a commission was appointed by seven interested municipalities in August, 1903, which commission later submitted to the Government a very comprehensive report, as a result of which, on July 5th, 1905, the Legislature appointed the Hydro-Electric Power Commission of the Province of Ontario to investigate the water powers of the province, their development and the transmission of electrical energy. This Commission made a very exhaustive study of the subject, and following the publication of its reports a very large deputation waited upon the Government, with the result that in May, 1906, the present Hydro-Electric Power Commission of the Province of Ontario was appointed to supply and transmit electrical energy from Niagara Falls and other sources of power to municipalities throughout the province.

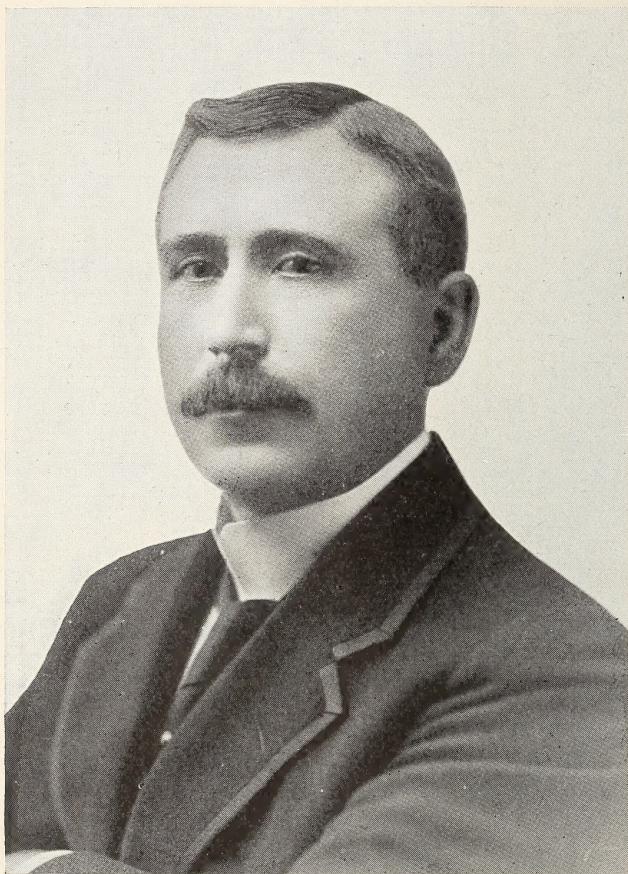
"The Commission encountered much opposition at the outset, chiefly from private interests, which declared that its policy would render the province bankrupt and ruin its financial credit; instead the credit of the Commission is so good as to enable it to borrow money at a much lower rate of interest than can be secured by private corporations.

"At first twelve municipalities came into the scheme. Estimates submitted by the Commission showed that \$4,000,000 would be necessary for the carrying out of the scheme as planned. Certain 'experts' warned the people that the project would cost at least \$12,000,000 instead of \$4,000,000. As a matter of fact the municipalities built their lines and stations, bought their



rights-of-way and all necessary apparatus at a cost considerably below the estimated \$4,000,000.

"In order to help vested interests, negotiations were entered into with existing power companies and a contract was finally entered into with the Ontario Power Company at the rate of



Hon. W. H. Hearst, Premier of Ontario

\$9.00 per h.p., which is considered one of the most favorable ever made.

"Mr. Gaby, the Chief Engineer of the Commission, is a graduate of 'The School.' He is possessed of more than technical and mechanical knowledge—he is reliable and has the integrity of character so essential in the administration of a work of this nature. The Commission has proved that men of honesty



and integrity can be secured for the administration of provincial affairs, as well as by private interests.

"At the end of the present year ninety-two municipalities will be taking power from the Hydro-Electric Power Commission. The investment of the province at present is \$9,100,000; the municipalities have invested over \$11,000,000, making a total outlay of over \$20,100,000 on the scheme. The net profit in the municipalities during the past year has been over \$1,000,000, which, on an investment of \$11,000,000, must be considered very encouraging.

"Every day we are finding some new uses for electricity in lightening the burdens of the toiler and notably in improving rural conditions. The effect of the co-operative system is to continually reduce the cost of power to the consumer and consequently the costs of manufacturing processes. In speaking with a railway magnate regarding the work of the Commission he told me that the industrial commissioner of his company had said that the greatest drawing card he could offer to industrial concerns was the cheap electric motive power available through the efforts of the Commission in many parts of the province. Another direct benefit to the people which results from the Commission's policy of constantly extending, is the establishment in the province of branches by many United States and other manufacturers.

"At one time the engineering graduates of our universities were obliged to go to other countries to seek employment worthy of their abilities. The Commission has changed this; it has in its employ over 150 graduates of Canadian universities, and constantly receives applications for employment from graduates of universities in the United States and other countries.

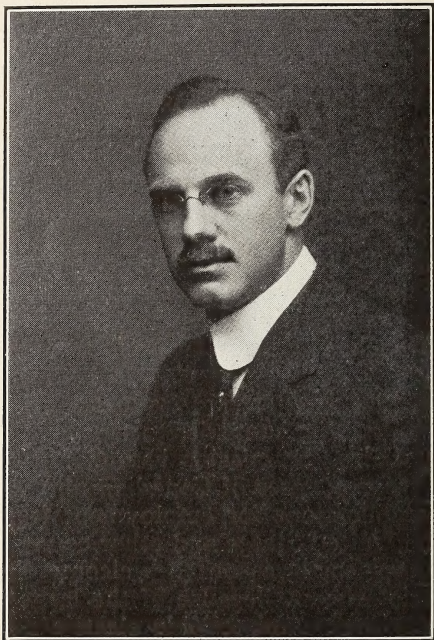
"Toronto has special reason to welcome the extension of the Hydro-Electric scheme, because of the large projects which she has in view. Cheap and reliable electric power will be of immense value to her a few years hence, when she begins negotiation for the acquirement of the Street Railway Co. upon the expiration of its franchise, and also in the development of her vast harbor projects.

"The aim of the Commission does not end at the furnishing of cheap light and power throughout the length and breadth of the province; it recently has undertaken the development of a system of hydro-radial railways which will afford cheaper and more expeditious travelling and transportation of manufactures and products. As in the case of power the profits from the operation of these railways will go to the people of the province and not to shareholders of private corporations. We have every reason to believe that they will prove economically successful from the beginning. Lectures and addresses are being given throughout the province where sufficient interest can be aroused to assure well-attended meetings. The scheme is meeting with



much success and the indications are that before many years South-western Ontario will possess a network of radial railways. It is doubtful if any other phase of the work of the Commission will be of greater value to the province at large than that of hydro radials, the benefits from which will be enjoyed by rural dwellers and not only by the centres of population.

"The municipalities interested in these radial railways are sending a deputation to the Government to present their claim for a subsidy, and there seems to be no reason why the Dominion



F. A. Gaby, B.A. Sc., Chief Engineer for Hydro-Electric Power Commission

should not grant such a subsidy, especially in view of the liberal assistance which has been given to railway companies in the past.

"We have now 433 miles of 110,000 volt lines in the Niagara Peninsula. Power had not previously been transmitted at so great a voltage and we were charged with foolish experimenting, but the work was undertaken only after most careful study by our engineers, the accuracy of whose judgment is testified to by the present developments of the system, which would not have been economically possible at a lower voltage.

"The Niagara Falls system is comparatively familiar to you and I have not sufficient time at my command to describe



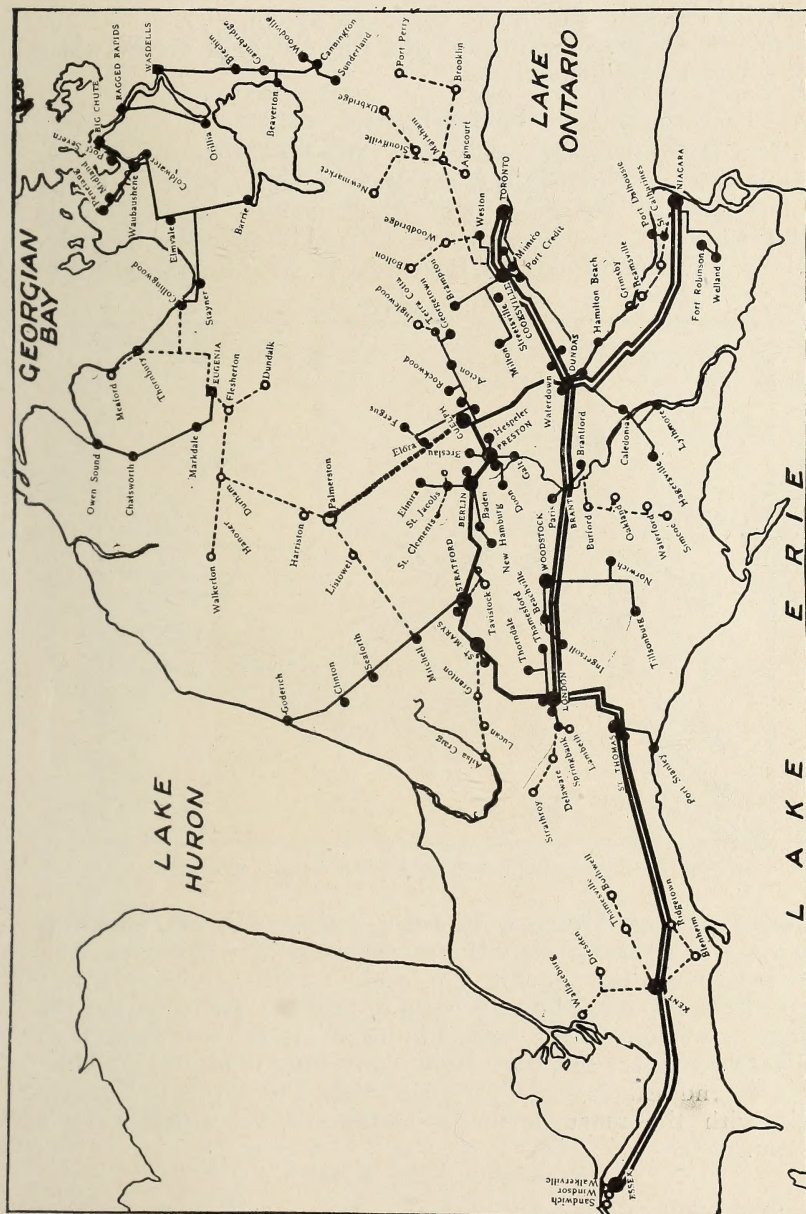


Fig. 1—Map showing the extent of the area served by the distribution systems of the Ontario Power Commission from Niagara Falls, Severn River and Eugenia Falls.

it in detail, but an idea of its extent may be had from a study of the map shown in Figure 1. We have several other systems which I will describe briefly, namely—the Severn system, the Waddell's Falls system, the St. Lawrence system, the Port Arthur system, the Ottawa system, and the Eugenia Falls system which is now under development.

### Severn System

"On the 10th of February, 1911, the Hydro-Electric Power Commission of Ontario entered into an agreement with the Simcoe Railway and Power Co., which had a generating plant at Big Chute on the Severn River, to supply power to be delivered by the Commission to Port Severn, Waubesaushene, Cold-

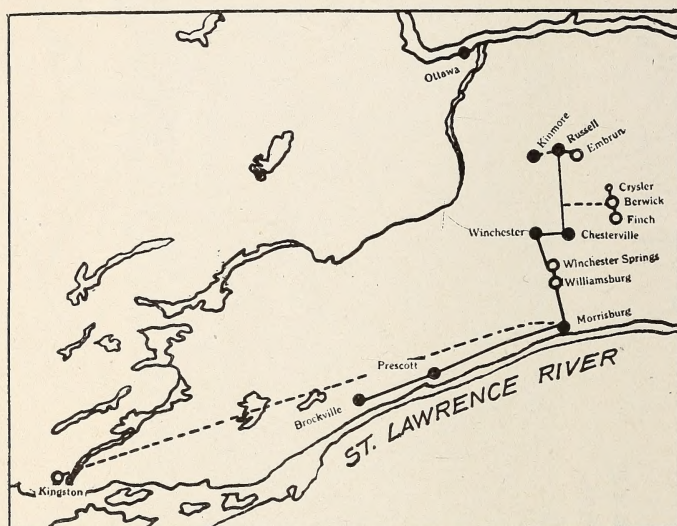


Fig. 2—Eastern section of Hydro distribution system.

water, Penetang, Midland, Elmvalle, Barrie, Stayner and Collingwood at 25,000 volts. A transmission line has been constructed connecting the Big Chute plant with another plant at Ragged Rapids, owned by the town of Orillia. The extent of the system is shown on the map, Figure 1. It is the intention to ultimately connect the Big Chute plant with Waddell's Falls on the east and Eugenia Falls on the west and through Eugenia Falls with the most northerly section of the Niagara Falls system.

### Waddell's Falls System

"Waddell's Falls is situated on the Severn River just where the river leaves Lake Couchiching, the northern arm of Lake Simcoe. This is the first place at which the Commission has



undertaken to generate power on its own account by the development of a water-fall. The station here may be operated in two parts if required since each bus is divided by disconnecting switches into two sections with one exciter, one generator, one bank of transformers and one transmission line on each section. The head is twelve feet. The present installation constitutes the total capacity of the fall. The Commission intends ultimately to connect this system up with the two other generating plants on the Severn River, viz., the Big Chute, and the Ragged Rapids. In the meantime power will be supplied to Woodville, Sunderland, Cannington, Beaverton, Gamebridge and Brechin, at each of which points there will be a station to step the current down from 25,000 volts to 2,200 volts for local distribution.

### St. Lawrence System

The Commission has entered into an agreement with the Rapids Power Co., of Morrisburg, for the supply of a quantity

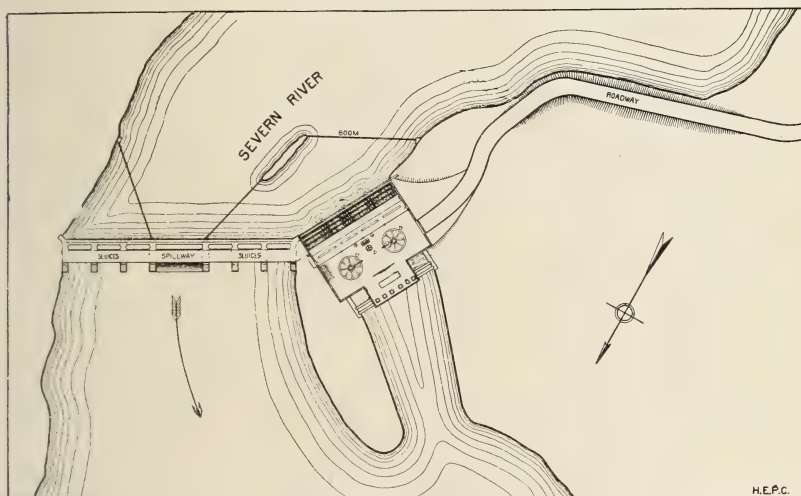


Fig. 3—Waddell's Falls Development—General Lay-out

of power to be distributed by the Commission at 26,400 volts potential to different points in eastern Ontario. Power lines of this voltage have been constructed to Prescott and Brockville in a westerly direction and to a number of smaller towns due north of Morrisburg as far as Russell. The probable extent of the operations in this district in the near future are indicated on the map shown in Figure 2.

"A contract has been closed by the Commission to obtain a further supply from a new plant at Waddington, N.Y., as it was evident that the supply available at the plant of the Rapids

Power Company would soon be inadequate. The generating company agreed to deliver the power to the national boundary, at which point the Commission will become responsible. It is thought that the power obtained in this way will be sufficient for considerable time, or at least until some larger scheme of development of the St. Lawrence River has been decided upon.

### Port Arthur System

"Power is purchased by the Ontario Commission from the Kaministiquia Power Company and supplied to the City of Port Arthur. It has constructed a 22,000 volt line and a 22,000/2,300

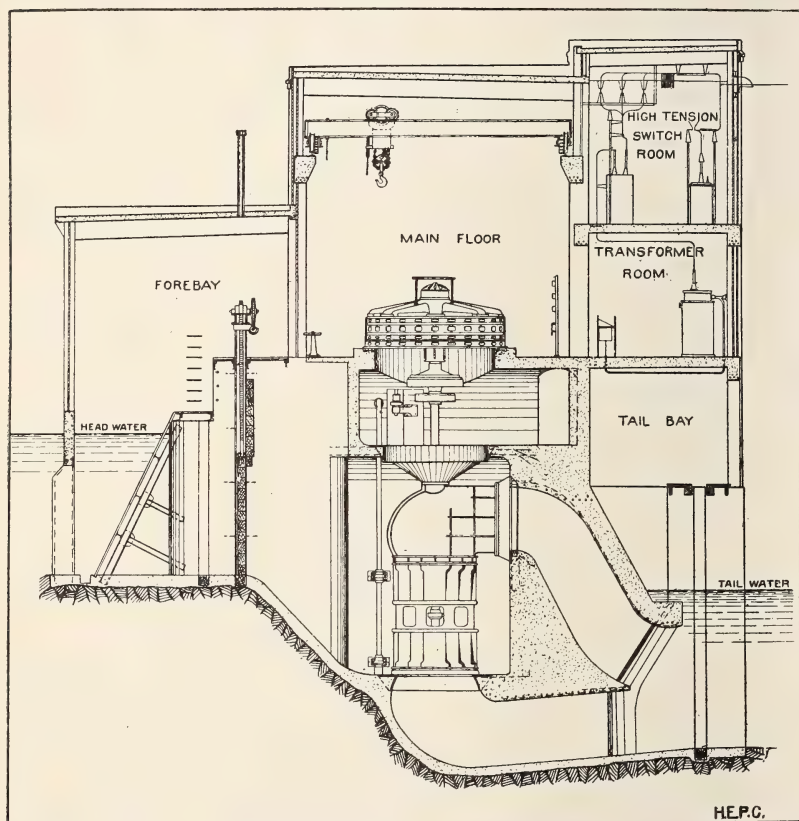


Fig. 4—Wasdell's Falls, Development—Cross Section through Power House

volt station. The original equipment had a capacity of 2,250 k.w. Port Arthur has two local sub-stations and has erected a new pumping station in connection with the municipal water-works plant.



"The rate for the purchase of power from the Kaministiquia Power Company is \$16.00, which makes the power, adding transmission charges, cost the municipality \$19.50 per h.p.

### Ottawa System

"In Ottawa, power is purchased by the Ontario Commission from the Ottawa and Hull Power Co., which operates within the Corporation limits. The rate paid to this company is \$15 per h.p. year. New consumers are being added in this city at a rapid rate and it is likely that in the near future additional power will be obtained for Ottawa, possibly at Chats Falls.

### Eugenia Falls System

"The source of power for this system is Eugenia Falls on the Beaver River, which was formerly owned by the Georgian Bay Power Co. It is intended to supply power and light to Owen Sound and the surrounding district.

"There was at first some uncertainty as to the minimum waterflow measurements of the Beaver River, and in order to eliminate this a sharp crested weir was built at Eugenia Falls and a recorder was employed for the purpose of making continuous flow measurements during the summer of 1913. The results of this investigation were satisfactory to the Commission and to the Town of Owen Sound, and a contract was entered into by which Owen Sound is to be supplied with 1,200 h.p. The initial development will be approximately 4,000 h.p. in generating capacity and the station will be planned for an ultimate 8,000 h.p. capacity. The head will be about 540 feet, the highest east of the Rocky Mountains. The work here is now well under way and it is expected that it will be completed early in 1915."

Sir Adam closed by saying that great as have been the achievements of the Commission in the past, even greater things may be looked for in the future.

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The following have registered in the fourth year at the "School" after an absence of a year or more:—R. H. H. Blackwell, '10, H. P. Frid, '11, C. W. B. Richardson, '07, H. B. Thompson, '10, H. K. Wyman, '11, P. J. Relyea, '13, R. A. Paul, '13, H. O. Leach, '14, and J. C. Christner, '14.

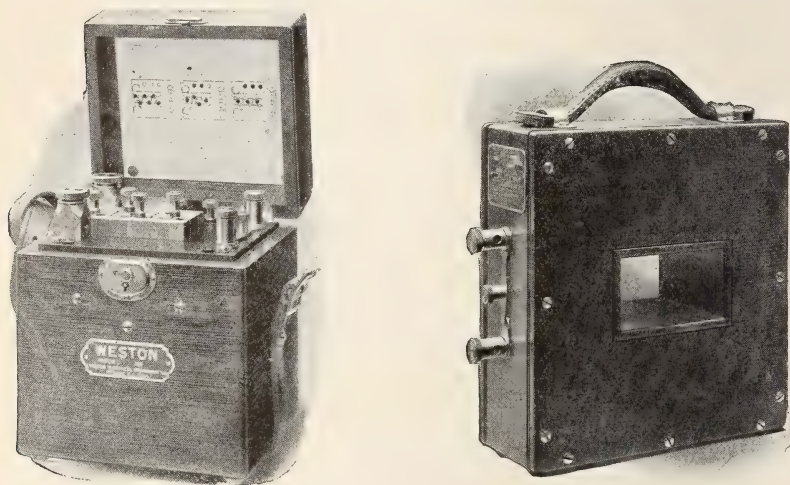
R. A. Ross, E.E., '90, has been retained by the city of Peterborough, Ont., as its representative in the settlement of the taking over of the plant of the Peterborough Light and Power Co. by that city.

A. E. Pickering, '04, formerly manager of the Tagona Light and Power Co., Sault Ste. Marie, Ont., has been retained as manager of the same concern since it has been taken over by the city.

## NEW WESTON INSTRUMENT TRANSFORMERS

Two new bulletins announcing and describing switchboard and portable instrument transformers of an exceptionally high order of merit have just been issued by the Weston Electrical Instrument Co. of Newark, N.J.

It has, of course, been recognized that instrument transformers should be designed and made with a much greater degree of refine-



ment than is necessary in commercial lighting and power transformers, and as might have been anticipated, these new contributions to the art of electrical measurement by the Weston Company are worthy of recognition as standards of excellence.

They represent the results of several years' careful and most thorough analytical study and experimental investigation of the many factors involved in developing and making instrument transformers capable of giving the highest degree of precision under the widely varying conditions incidental to their practical use.

Two different Models of Portable Current Transformer are listed. One type has three self-contained primary windings and the other is of the inserted primary type, the ratio depending upon the number of turns of the primary that are passed through the aperture.

There is also a portable potential transformer which is made in various ranges.

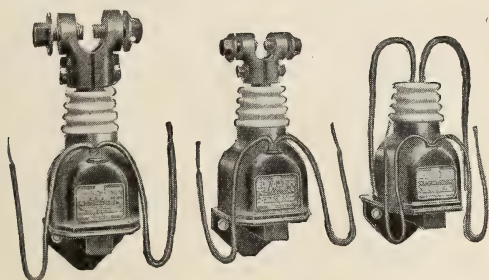
The Switchboard Models are made in several different types, which vary in appearance with the ratio, the volt-ampere capacity and with the potential of the circuit.

The manufacturer emphasizes the point that these transformers are unequalled in precision, in design, in workmanship and reliability in service.

Indeed, special stress is laid upon the accuracy, the ratios of transformation, and upon the fact that the design and proportions

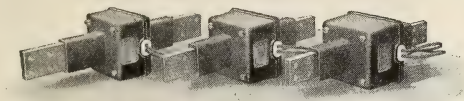


of the transformers are such that it is unnecessary to have instruments specially calibrated with the transformers in order to obtain



the degree of accuracy to which high grade instruments are guaranteed when used without transformers.

This feature is of special interest in connection with tests with portable instruments, because in many quarters the impression has prevailed that no transformers could be made that would assure the users of the degree of accuracy for which a high grade portable



instrument is designed, unless special precaution had been taken to calibrate a particular instrument with a particular transformer.

These new Bulletins are numbered 1501 and 2001, the former dealing with Switchboard Instrument Transformers and the latter with Portable Types.

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O. W. N. Charlton, '11, formerly with the Department of Interior, Ottawa, is now associated with W. T. Haring, general contractor, 100 Washington street, New York, N.Y.

R. P. Johnston, B.A. Sc., '14, is on the designing staff of the Welland ship canal at St. Catharines, Ont.

D. B. Cole, B.A. Sc., '11, formerly smelter maintenance engineer for the Canadian Copper Co. at Copper Cliff, Ont., is now with the Cleveland Cadillac Co., Cleveland, Ohio.

Hugh Wallace, B.A.Sc., '14, is inspector on the construction of the Welland ship canal at Port Weller, Ont.

V. S. Chestnut, B.A. Sc., '09, is assistant to the resident engineer, section 1, Welland canal, at Port Weller, Ont.

C. N. Temes, B.A. Sc., '14, is in the draughting office of the Ontario Hydro-Electric Commission, Continental Life Building, Toronto.

## **"THE WIELDER OF THE WEAPON"\***

By PROFESSOR H. E. T. HAULTAIN, C.E., '89

Mr. Chairman and Gentlemen:—

The majority of the papers read before this Society are descriptions of work accomplished, descriptions of successful results, accompanied by detailed plans and specifications. This effort of mine is as far removed from this type of paper as it is possible to go. It is but a groping. Perhaps it would be more becoming the dignity of this meeting if it were referred to as a reconnaissance, but the region of the survey is not new. It is one we have all looked at, but by most of us it is passed by as being unfruitful or unpleasant. Safety and success are the prime essentials for much of the work of the engineer, with the result that where he cannot see clearly, he is the more timid. He avoids doubtful material; where he cannot avoid he raises his factor of safety. He will rarely talk of his mistakes, though they may be of much greater educational value than his successes. In fact, he will rarely talk about his work except in the form of plans and specifications. Yet I am venturing before you with my groping. One reason for this is that of late I have viewed the subject from a new standpoint, one far removed from that of the field engineer.

Last year the president of the Institution of Mining and Metallurgy said to me, "You are at a gate of the profession, what are you doing to guard it?" Part of my function as a teacher is to guard the profession as is also part of the functions of this Society. If I am at a gateway you are at the citadel. I submit that it is probable that the activity of this part of our functions might with advantage be very materially increased. Perhaps it is still more important that the range of this activity should be widened. Many will say that the profession is being well guarded, that the standard is high, is in fact very much higher than is generally realized. With this I would agree, more particularly with the last part. Is it not possible that this is a point that we have been neglecting.

A recent editorial in the University Monthly contained a reference to "the feud in Medicine and Applied Science between the practical and the genuinely University conception of training."

I do not think that the word feud expressed the idea satisfactorily, but the condition referred to, has impressed me more strongly than any other academic condition in the six years I have been in the

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\* A paper read before the Canadian Society of Civil Engineers in Montreal, Nov. 5th, 1914

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\* The paper was preceded by some slides, one of which showed clause 2 of the Engineering Ethics section of the By-laws of the Can. Soc. C.E. Mr. Haultain said that he sought a broad interpretation of the last part of that clause, viz.—"The surest way for an engineer to obtain such necessary consideration and deference from the public will be found in his manner of carrying himself." Another slide showed the man of Coreze with his two weapons, the club and the stone.



University. There seems to be a wide gulf between the older faculty of Arts, and the faculty of Applied Science and Engineering. In the picture as it appears to many observers, the bright light and the high land is on that side of the gulf away from the engineers. In fact in a general view, there is not a gulf which betokens an equality of level between the two shores, there is rather the appearance of high mountains and valleys. There is no doubt that there is a haze of misunderstanding between the two. I do not know that this atmosphere does any harm or causes any more unpleasantness than does occasional bad weather. I sometimes think it may be a sign of health. Perhaps if it were intensified it might stir up some healthy activity. I bring it in only as an illustration. It is not exactly the same way out in the field, though the picture may be obscured by many conditions absent in the smaller academic world. Are not the engineers in the eyes of the public but hewers of wood and drawers of water?

Possibly it is sufficient that we remain so and confine our attention to the wood and the water as becometh men of low degree. Without doubt the general attitude of the engineer is one of indifference in this regard.

Is it not possible that this is the real problem before the engineering societies. Is not this really the whole of which the other problems are but parts?

If this condition is to be changed, how is it to be accomplished and who should attempt it? Engineers do not talk about engineering, except to themselves and in their own language. It is nobody's business to talk about it for us. Others misunderstand us because they do not know us. They recognize that we are different from them. We must be either inferior or superior. Naturally they think we are inferior. Can you blame them? We take the trouble neither to dress nor speak the part.

One reason, without doubt, is that our work is intensely interesting and we are so busy with it that we have neither the time nor the energy to pay attention to anything but our work. Probably another reason lies in the fact that we are so accustomed to putting our ideas in the form of plans and specifications, that not only do we find other language difficult, but we avoid expressing ourselves on any subject that has not formed itself in our minds clearly and distinctly. An elaboration of details which the engineer's mind demands, only befogs the public or robs them of their interest. Broad impressions, sometimes purposely distorted to what the engineer would consider inaccuracy, attract and educate the public.

We all shy from the question, "What is Engineering?" It appears an unprofitable and tiresome subject. I am inclined to submit, however, that some of us at least should tackle it and keep on tackling it. It is neither possible nor necessary to draw complete plans and specifications, but we must produce a general view that will convey correct impressions, not only to ourselves and to those entering at the gate, but also to the outside public. Do we think the lawyer or the business man, or the man about town has anything

like a true understanding of the engineer, and his ideals? Are we not quite sure in our own minds that their ideas on the subject are very far from the truth. I am perfectly sure that the ideas concerning the engineer and engineering held by the University Senate are very materially different from those held by the teachers in the Engineering faculty. An Arts professor once said to me, "I have no patience with your ideas of education. Your only reason for wanting analytical geometry is to enable you to cut out boiler plates." I could hardly frame a statement that would be further from my ideas of education and yet I failed completely to convey this to my colleague. The association in his mind between the high mental training of such a subject and the engineer reached only to the cutting of boiler plates.

Another colleague inferred that the difference between Science and Applied Science was something like the difference between wall paper in the roll and on the wall. All the great art and skill lay in the roll. The applying it to the wall was a simple matter; a matter of low degree.

What, then, is engineering and who is the engineer? If he is not simply a hewer of wood, what is he? Does he belong to any specified herd or are we all mavericks? Is there a distinguishable brand on our hide or are there only irregular and uncertain marks proving only that we are not exactly wild beasts. Are we sufficiently gregarious to constitute a herd, or is it that there are only a few of this kind and do they only herd from fear. Evidently the simile is badly taken.

Are we a tribe—if so wherein do we differ from those outside the tribe? Have we inherent characteristics? Are we differentiated from other tribes? Have we any tribal pride and of what are we proud? Or are we simply content to be the vassals of the community? Are we leaders or simply workers?

I am inclined to think that the simile of the hewer of wood is at the base of most of the misunderstanding. Let us go back to the beginning of things, to the dim red dawn of man. Did not the man of Coreze represent at his time the greatest force in the world? Was he not above all the animals? Wherein was he different from them? Was it not probably in the fact that he used forces outside of himself to win from nature. Was he not the inventor and the first user of the weapon. Was not the wielded club or thrown stone the first step towards the separation from the brute. From then until now who has always been the greatest man? Let me quote from my paper, "The Geologist," a paper read before the Canadian Mining Institute in March, 1913, and published in the Annual Volume for that year No. XVI, and also published in The Canadian Mining Journal, March 15th, 1913. "When we go back to the beginning of things, that it is to the beginning of things for man, to about the times, let us say, of *pithecanthropus erectus*, the story-teller was beginning. He was almost the first luxury. Possibly man's first distinction was that he was a fire-using animal. Certainly about the same stage of his development he became a story telling



and story hearing animal, and the story telling part was certainly more removed from mere animal than any other phase of his activities. Progress in all stages has been based largely on co-operative organization and this came first with the fighting animal, but organization alone did not win out from the animal stage. Organization could and does exist without language and without man, but we departed from the animal through language and progressed through language. Language was produced by and for the story-teller. For his purpose was language developed and without language we would have had no modern man. The neolithic scribe on bone that 'mammothistic etcher at Grenelle' was a later development of the story-teller, who told stories in pictures and was not only the forerunner of the comic supplement, but of all that we understand in modern pictorial art. Later he told stories in song and in mimicry so that all our art, which represents our greatest departure from the anthropoid ape, is the work of the story-teller.

"Now the story-teller is still the greatest man among us. What does Kipling get per word? And has he not had the refusal of the high honours of the realm? Theodore Roosevelt received \$350,000 for seven years' work as President of the United States, but received a million dollars for the story of his African holiday."

Man was a weapon wielder before he was a story teller. The weapon wielder was the real leader. We always have and always will look up to the story-teller, but we bow down to the successful wielder of the weapon. He has had more of the world's real adulation. Though he may use the same weapon he is the antithesis of the hewer of wood. The conquered slaves, the weak and the imbeciles were the hewers of wood and the drawers of water. It is true that they won something from nature, but they made no progress and they risked nothing in the effort. Man's struggles against nature has been only a small part of the sum total of his effort as compared with his struggle with nature and the struggle with nature to-day is more universal, more rapid, more intense and more successful than ever before. The man in the forefront of the struggle, he who is forcing nature to the use and convenience of man as never before is the engineer and the reason that he progresses more rapidly and more successfully than ever before is largely on account of his new weapons, but still more on account of himself and his methods. His weapons are drawn from the sciences but the wielding is his own. The choosing of the weapon and the plan of campaign are his. But he is in the thick of the fight and there are no war correspondents. He makes no effort to hold communication with non-combatants. He is busy for results, and to him nothing but results counts. He has not yet got to the stage of holding communication with the public through means of show and parade, of brass bands and uniforms. No slave toiling at the wood pile ever shrank from the public gaze more carefully than does many an engineer from publicity. He is content to stand behind his wood pile and the public thinking that the pile arrived by a simple process of hewing give as little attention to the man as to the slave. Nobody tells the public

that to produce the modern pile there has been a struggle calling upon higher standards than ever before in the struggle with nature; that the men who are winning in this struggle are men of as high a calibre in mental effort and moral fibre as in any other branch of human affairs. and very much higher than in most other callings.

We do not dress the part. To the public eye dignity and weight of personal character are intimately associated with gown and wig, and valour and worth with uniform and decorations. We have neither religion nor law nor military without their wrappings which tell to the ordinary man plainer than any words that the man within is of high worth in the general scheme of things. We neither talk nor dress the part. We are pleased to say that we work and that workers don't talk. As a matter of fact we fight. The word work only covers a part of our efforts. We wield weapons and plan campaigns and we risk personal safety in reputation if not in limb and life. Some will say that the fighter also doesn't talk. No, he does not talk the part, he dresses it. I can't imagine Lord Roberts liking the fuss and the feathers, but he was punctilious to a degree in such matters. And we engineers, with the exception of a few whom we rather blame for "advertising," do nothing—absolutely nothing to tell our fellows what manner of men we are. Is it not possible that this is the real problem before this Society. We cannot wear a uniform either in the shape of a helmet and tunic or of wig and gown, nor can we have parades and brass bands.

Publicity of some kind we need more than anything else, but it must be of the right kind and apparently the right kind has still to be discovered. We must recognize that there are innumerable kinds of useful publicity and that many, very many most extraordinary ones are really good form. General French can wear white feathers in his hat. A judge is never so impressive as when garbed in his wig and gown which look only absurd under other circumstances. But these are all hallowed by time and are denied to us. We are so young that language itself is denied to us. Our very name is without meaning or what amounts to the same thing, has many meanings. And so with many other words connected with us, technical, practical scientific, theoretical and so on. But the means of publicity, though many, may still be added to. The magnificent home of the Institution of Civil Engineers must by its dignified appearance alone be of great educative importance. The knighting of Sanford Fleming was not without its value, but needs repetition as does all publicity. "There are certain conditions of intimacy, continuance and repetition which are necessary if an idea or feeling is to gain a foothold in the mind and remain." At the celebration this year of the addition of the word Royal to the name of the Canadian Institute an organization founded by Fleming sixty odd years ago, a speaker of the evening, not content with Sir Sanford's reputation as an engineer, laboured to show that he was a scientific man, a geologist forsooth, because he had published the fact that the sands of Toronto Island had come by wave action from Scarborough bluffs, and as a



scientific man was worthy to have been a founder of a society honored by the word Royal in its title.

The pitiful position held by many of the municipal engineers is a publicity of the opposite kind that is doing us much harm. On the other hand the good citizen activities of some of our engineers who are energetic on Civic Guilds and other public committees is of the right kind. To a few it is given to be presidents and vice-presidents of large commercial organizations. Their presence in our council is good publicity. There are many avenues closed to us, however. The engineer is too direct and too, what-shall-I-say, to be a successful politician. We study our men but not our fellow man. The settlement of labor troubles comes more and more to the engineer, but we will not succeed in persuading our fellow man to elect us to office for a long time to come. The study of our fellow man may be the first step to a successful publicity.

Am I stumbling too much in my groping over this idea of publicity. Many of you, especially those who have made your mark and your assured income may say that the last thing you want is publicity. But surely you will agree that the proper kind of publicity, the kind that will educate the public to a better appreciation of the engineer would be a great help and benefit to those coming in at the gate of the profession, and is not this Society a guardian of all the best interests of those entering the gate as well as a guard against incompetents and wrong doers. The fact that ordinary methods of publicity offend us is no reason why we should avoid all publicity. The problem that is before us is to find suitable publicity. Without presuming to do other than grope, might I suggest that legislation that would compel municipal engineering work to be under the control of engineers of the rank of members of this society would be very good publicity. The publication of a comprehensive code of ethics might also be good publicity. The expulsion of some of our members might be as good as any other form. Possibly we have not guarded the citadel so carefully but that some have entered who are not fit company for decent men, much less for engineers.

In our publicity direct attack will not do. We are not good enough as story-tellers. It may be thus that all that counts for health and prosperity is based on the work of the engineer, but the story or the picture of our work shows to the public but a pile of wood or a calabash of water. Larger or smaller but still the same. We must exhibit the man—we must show that it is not the slave and the imbecile accomplishing only through toil. We are wielders of the weapon and we must show that the wielding calls for all the best there is in a man by any count you choose. We must emphasize the man. The weapon has been glorified—the forger of the modern weapon of the engineer is a trained story-teller—the story-telling is a part of his training that accomplished his education as a maker of weapons. The modern worker in science not applied is fully one half story-teller and often the scientific half exists primarily for the story telling half. Just as there are many alleged weapons wonderful

in their gilt and filagree whose only use is that of adornment so is much of science polished and attenuated for purposes of exhibition rather than of use.

But polished or unpolished, modern science is so wonderful and the story of it is told so well and so often that the forger of this weapon appears on a very much higher plane than the wielder of it. As usual, truth is at the bottom of the well and search shows that the reverse is the truth. The man who can choose his weapon—who can see so broadly and so clearly in the complexities of local conditions that he can select the weapon to fit his campaign and then with skill and moral fibre wield the weapon, is not less worthy of high place in the community than the maker of weapons no matter how wonderful or polished they may be.

This simile will offend by its incompleteness and apparent weakness. Is the gun-layer greater than the designer and constructor of the modern 13-inch rifle. This simile seems in error. I use it in an attempt at a broad impression—a parallel to the hewer of wood and drawer of water, not as a definition. The man from Coreze used the club and the stone and won thereby progress for the race—it was the wielding of these weapons that won. The modern weapons developed by science have given man much greater power over nature but it is still the wielding of these weapons that makes them of benefit.

The doctor and the engineer are the wielders of these modern weapons in the struggle against nature. The gun-layer taking orders from the fire control in order to destroy his fellow man is not a parallel with our man of Coreze.

This wielding of the engineer is new, is so very new and is growing so rapidly that we have no comprehensive view of it. It is not part of the so-called sciences, it is not applied science, it is man in action, using the sciences—in the most complex and the most useful action progress has had. If we simply refer to this action as work, the mind of the public will simply follow the old nerve path and associate it with toil, with the slave and the wood and the water. Do we need anything different, do we require the higher approval of our fellow man? Some of us, perhaps, are not interested.

What about our duty to those entering the gate?

What about our tribal pride?

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## THE RHYMES OF THE RE-SURVEY

By R. SIDNEY BARTRAM

(With apologies to Robert W. Service)

### PART I

Now this is the tale of the labours performed by a survey gang

Away in the back of the wild lands, where nobody cares a hang;  
Where the brown bear prowls in the thicket, and the screech owl  
splits the night,

And skunks and other blossoms sweet, yield scents of rare delight.



When grey the dawn is breaking, your duties are begun,  
Throughout the hours of daylight you labor with the sun;  
And when the shadows lengthen, and the stars are shining bright,  
You take a shot at the polar star in the middle of the night.

You sleep in a dis-used box car, on a bed of boughs of spruce,  
But there's nothing to get by kicking, so what in hell's the use?  
You dine on pork and cabbage, on pork and beans you sup,  
And there's pork next day for a breakfast dish, to clear the remnants up.

You pump a rusty hand-car for seven miles down the track,  
And the sweat runs into your eyebrows, and you long to ease your back.

With picket, chain and transit, you run the traverse through  
For seven miles, or maybe ten; as much as you can do.

You sit on a rotting deadfall, and open a can of pork,  
And eat a hasty dinner, with fingers for a fork;  
Then on you go with the traverse, as hard as you can push,  
Till the shades of night are falling fast, o'er swamp and track and bush.

And then you hurry homeward, to the supper waiting there,  
And think of your lowsy spruce-bunk, and the sleep that knows no care;

But, swinging round a rock-cut, you "make a meet" with a freight,  
And "Safety First" is a maxim sound, so you leave the car to its fate.

The car is smashed to splinters, which pleases the engineer,  
While you stand and swear in chorus, but only the night winds hear.  
So you shoulder the blasted transit, the picket, axe and chain,  
And start to tramp it homewards, a dozen miles in the rain.

At last, when the stars are shining, and the moon is swinging low,  
You reach the cars on the siding, foot-sore and full of woe;  
You kick while you eat your supper, you grouse when you go to bed,  
And curse all night at the chap who snores, and wish that you were dead.

But somehow, in the morning, you wake as fresh as paint,  
Although last night you thought the life would demoralize a saint;  
And you gather the junk together, and out on the line you go,  
For another day's hard labour, in rain, or sun, or snow.

But to-day is not track traverse, it's Township lines in the bush,  
And your axe bites deep of the cedar, and down she comes with a rush.

You splash your way through the muskeg, you flounder across the creek,  
And flies and "skeeters" drink their fill till you feel too mad to speak.

But it's not bad work in the summer, it's rather fine in the fall,  
 But in the good old winter it's the greatest job of all;  
 With frozen ears and fingers, and nose that you cannot feel,  
 You laugh aloud with your stiffened lips, for you're doing the work  
 that's real.

And so it was in the Beginning, and so it is to-day,  
 And so shall it be to the end of things, when you are taken away;  
 Until you are made into Angels, with transit, and tape and chain,  
 You will work for the darned old C.P.R., World without End,  
 Amen.

## PART II

### "THE NEXT WORLD"

Now this is the fate of surveyors, who love their beer too well,  
 They must do their work in Hades, surveying the bounds of hell;  
 They must blaze their trail through the darkness, they must run the  
 Line of Regret,  
 Till the Hubs of Hell are planted well, and the Devil's Corners set.

And this is the fate of the Draughtsman, a red hot compass and pen,  
 And a red hot draughting table, for ever and ever. Amen.  
 He must draw the Thing as he sees It, with a Flag on every Hub,  
 Till a white hot print of the Bounds of Hell is passed by Baalzebub.

And the Picketmen and Chainmen must set a witness stake,  
 Well squared and truly numbered, in the midst of the Burning Lake  
 They must drag the chain forever, and measure every lot  
 Through bush that burns but never wastes, and swamp that's  
 always hot.

And the Cook who cooked their dinner, oh! what shall be his fate?  
 Shall he stand beside the furnace door, and fill a fiery plate?  
 Oh no, he shall stand in the corner, away from the furnace heat.  
 He had it hot in the cook car, so now he shall cool his feet.

For surveyors and all their outfit are sinners beyond recall,  
 They hold no law but the law of might, which gives to the mightiest  
 all.

So he who has learned his lesson, who has served his year and a day  
 May sin to the full of his heart's content, and none shall say him  
 "Nay."

But the Devil stands in the Gates of Hell, to see who each may be,  
 When an O. L. S. is sighted, he rubs his hands with glee,  
 He calls aloud to his stokers, "Ha, stoke the furnace well,  
 Here's another surveyor coming along, we must make him hot in  
 hell!"

Nipigon and Schreiber subdivisions, C.P.R.,  
 October 27th, 1913.



# APPLIED SCIENCE

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Transactions of the University of Toronto Engineering Society

DEVOTED TO THE INTERESTS OF ENGINEERING, ARCHITECTURE  
AND APPLIED CHEMISTRY AT THE UNIVERSITY OF TORONTO

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## EDITORIAL

### THE SMOKING ROOM

After many years of practically uninterrupted agitation among the undergraduates for a smoking room, the Engineering Society executive is to be congratulated on at last securing Room 18 in the Engineering Building to be used as a shrine to "My Lady Nicotine." Thereby will be supplied a long felt need, as the existence of a common lounging room where the students can meet, read and smoke, and be congenial, will afford another medium of fostering unity among the men, and keeping alive the esprit-de-corps which has always been characteristic of the Faculty of Applied Science and Engineering.

It is already popular with the members of the society, even though there are as yet only bare undecorated walls, curtainless

windows, imaginary cuspidors, and chairs with the same kind of cushions. Reading tables and paper racks and some furniture have already been provided and it is intended that after some time we will have a comfortable and attractive reading room, where the students will have free access to the daily papers and journals and periodicals of interest to them.

A few members, it is said, are contemplating giving donations when they graduate, toward the appropriate furnishing of this room. Professor Haultain, the first student president of the Society and the senior living president of the Society, has given concrete expression to his interest in the student organization by offering as a gift, an enlarged photograph of the late Dean Galbraith, to be hung in this "common room" for the students. His action merits the gratitude of the men of the "School," and will have its elevating influence in keeping before the minds of the students of future years, the honored, respected, and much revered late Dean Galbraith, who was the founder of the "School" and the founder and first president of the Engineering Society.

No doubt there are many others who, having felt the need of such an accommodation for the students during their undergraduate days, will be pleased to know that the long sought treasure has been found, and will take the opportunity to contribute in some way toward rendering the room appropriate and attractive.

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### TRIP TO THE WELLAND SHIP CANAL

On October 31st the Toronto Branch of the Canadian Society of Civil Engineers conducted an excursion to the Welland ship canal and were accompanied by a large number of the members of the University of Toronto Engineering Society as their guests. Many, taking advantage of this opportunity to visit the vast and varied work on the canal, left the Union station at 8.10 a.m. on a special train and were joined at Merritton by about thirty-five undergraduates who had, on the previous day, been on an inspection tour of the power plants at Niagara Falls.

When the party reached Thorold it was divided into smaller sections, each section being directed by a member of Mr. Weller's staff. Section 3 of the canal and also the Government stone crushing plant were inspected on foot and the various phases of the work were fully explained by the men in charge. Sections 1 and 2 and Port Weller harbor were traversed in open cars hauled over the construction railway. After the work had been all covered, special cars conveyed the party to the Welland House, St. Catharines, where appetites whetted by the day's outing were fully satisfied.

The day was profitably spent, as the work presented many phases which were of great value, especially to the undergraduate, who in particular feels the need of greater familiarity with the practical side of engineering. The party was most royally treated by Mr. Weller and his staff, and a cordial invitation was



extended by Mr. Weller to the men to return again on a similar excursion. Another trip in the spring when the work is further advanced would prove a valuable supplement to the academic instruction received by the students, and it is possible that such a trip will materialize.

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### MEETING OF CLASS '09

On the evening of November 10th, thirty members of class '09, resident in Toronto, had a dinner at the Strollers' Club, on Yonge St. Mr. H. Irwin gave a talk on "The Engineer on the Battlefield." A number of the men present are taking a course with the Royal Canadian Engineers, and Messrs. W. T. Carlyle, B. Langmuir and others took part in a lengthy discussion of the engineer's work in operations of warfare. About eight o'clock the party dispersed, a large number of them joining in a theatre party at the Gayety, the guests of Bert Alison. The probable date of the next meeting will be Tuesday, December 15th. The details of the programme have not yet been arranged, but further notice will be sent out by the secretary, Mr. R. Workman. If there are any '09 men in or near Toronto who are not receiving notice of the meetings, Mr. Workman would be glad to have them communicate with him at the Engineering Building, University of Toronto.

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### MINING AND METALLURGICAL CLUB

At its meeting on November 11th the Mining and Metallurgical Club was fortunate enough to have Mr. George G. S. Lindsey, K.C., President of the Canadian Mining Institute, to address it, his topic being "Canadian Mining, its Needs and Difficulties."

Mr. Lindsey introduced his subject by showing how much the existence of mining owes to the prospector, but on the other hand, how the profession is being held back by the difficulty of the prospector and the capitalist or engineer in meeting on a common basis concerning the value of the claim. The prospector wants to be paid for enduring loneliness and suffering hardships while searching for the elusive vein, and the mining man wishes some tangible value in return for his purchase price.

The speaker next uttered a warning concerning a certain type of mining broker who floats companies without any visible indication of a mine and whose chief object is to line his own pocket.

Turning to the more prominent mineral productions of Canada, Mr. Lindsey gave figures to show the wide variation in costs and profits and pointed out the need in many cases of care at every turn in order to declare dividends. In the case of iron the profits are very low and have to be supplemented by combining allied industries such as railways, power plants, etc., with that of iron and steel. An interesting fact pointed out was that there

is a distinct shrinkage in the demands for iron and steel on account of the fact that our railway construction is reaching its completeness.

In conclusion Mr. Lindsey pointed out that although Canada's mineral resources were vast in extent, the sources of capital for development were equally extensive, and predicted that mining in the future would be much less "happy-go-lucky" in nature as the prospector's attitude changes, and expressed the hope that mining boards of directors would soon see the advisability of including a technical mining man in their number. As a parting word, the speaker admonished the coming mining engineers to maintain a high standard of integrity and to raise the dignity of the profession by meeting the public in an honest and open manner.

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### Harvey-Butters

On Wednesday, November 18th, at Niagara Falls, Ont., Mr. D. W. Harvey, B.A. Sc., '09, was married to Miss Catherine Lowell Butters, daughter of Mr. and Mrs. James Butters, by Rev. W. B. Findlay, of Toronto.

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### McQueen—Christie

On Wednesday, October 28th, Mr. P. H. McQueen, '14, of the editorial staff of the Maclean Publishing Co., Toronto, was united in marriage to Miss Mamie E. Christie, of Toronto.

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### Hopkins—Parker

On November 9th, 1914, Mr. Percy E. Hopkins, B.A. Sc., '10, was united in marriage to Miss Charlotte H. Parker, daughter of Mr. and Mrs. Thos. Parker, 142 Browning avenue, Toronto.

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### Huether-Forsyth

On Wednesday, November 25th, Mr. A. D. Huether, B.A.Sc., '08, was married to Miss Jean Barrie Forsyth, daughter of Mrs. Thomas Forsyth, Berlin, Ont. Mr. and Mrs. Huether will reside at 47 Highview Crescent, Toronto.

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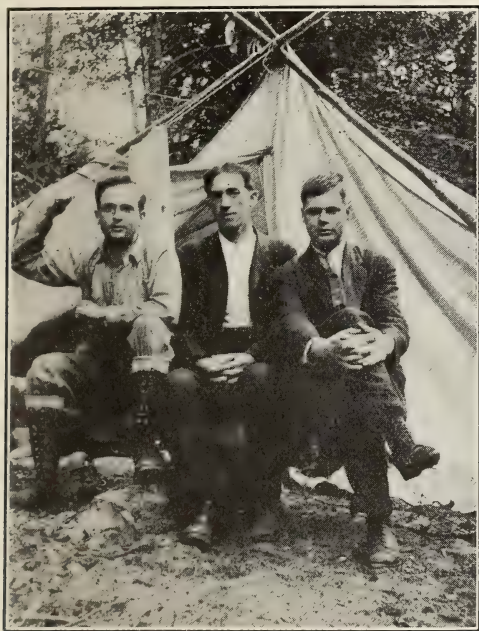
C. F. Szammers, '11, is employed with Sherwood & Sherwood, general contractors, Toronto, Ont.

M. E. Nasmith, '08, went to Kristianssands, Norway, in January of this year to make a study of a nickel refining process in operation there, and returned the latter part of July. We undertand that the work which he was doing in Norway was done for Canadian interests which expect ultimately to establish a nickel refinery in Canada.



## WHAT OUR GRADUATES ARE DOING

The accompanying illustration shows a trio of "School" graduates in British Columbia. On the right is Mr. A. M. West, B.A. Sc., '08, city engineer of North Vancouver; in the centre is Mr. G. S. Hanes, B.A.Sc., O.L.S., '03, mayor of North Vancouver and formerly city engineer of that city; on the left is Mr. W. Chester Smith, B.A. Sc., '10, district engineer, Water Rights



A trio of "School" men in British Columbia

Branch, Department of Lands, British Columbia. The photograph was taken at Mr. Smith's camp on the Seymour River, where he was in charge of work in connection with hydrographic surveys on which was based his report on Greater Vancouver's water supply, which appeared in the annual report of the Minister of Lands for the Province of British Columbia for the year ending 31st December, 1913.

Bruce McKendrick, B.A.Sc., '14, is with the Dominion Dredging Co. at Port Weller, Ont.

E. P. Muntz is inspector on section 2, Welland ship canal, at Homer, Ont.

P. T. Kirwan, B.A. Sc., '10, is chemist with the Inland Revenue Department, Ottawa.

H. D. Davidson, B.A.Sc., '13, is employed as inspector on section No. 1, Welland ship canal, at St. Catharines, Ont.

J. H. Billings, B.A. Sc., who last year was instructor in mechanical engineering at the University of Missouri, Columbia, Miss., left in July for Germany, intending to study for a year in Berlin. While he was still in London, Eng., the war cloud appeared and it was necessary for him to change his plans. Mr. Billings is now a candidate for master's degree in the Massachusetts Institute of Technology, Boston, U.S.A., studying machine design and heat engineering.

There have been a few errors in connection with some former lists of "School" men who have enlisted for active service. The following is a list, corrected so far as we have been able to get information—enlisted with first contingent in Canada:—C. H. Mitchell, '92, W. H. B. Bevan, '05, T. C. Irving, '06, N. R. Robertson, '06, H. F. H. Hertzberg, '07, R. Y. Cory, '08, G. E. D. Greene, '09, H. N. Klotz, '09, P. J. McQuaig, '09, W. M. Philp,



A Group of Canadians at Salisbury Plains. (In centre is W. J. Baird, B.A. Sc. '10)

'09, W. J. Baird, '10, A. G. Code, '10, J. M. Duncan, '10, M. B. Watson, '10, N. Lawless, '11, R. V. McCauley, '11, C. A. Bell, '13, C. B. Ferris, '13, E. S. Fowlds, '13, A. G. Gray, '13, J. J. Hanna, '14, J. Kay, '14, W. E. Phillips, '14, A. C. Oxley (?), F. S. Rutherford, '14, P. G. C. Campbell, '15, C. P. Cotton, '15, G. L. Magann, '15, D. H. Storms, '15, Hal Wallace, '15, R. W. Downie, '16, H. A. M. Grasset, '16, F. H. Marani, '16, K. E. Tobin, '16, R. W. Harris, '16, Hugh D. Wallace, '16, P. C. DeGruchy, '17, F. L. Eardley-Wilmot, '17, T. S. Glover, '17, I. M. R. Sinclair, '17; enlisted in England:—L. C. M. Baldwin, '13, F. C. Andrews, '14, G. B. Taylor, '14, G. B. Macauley, '14, G. G. Blackstock, '15, H. A. Heaton, '15. Among those who have enlisted for active service with the



second contingent are the following:—Harold M. Campbell, '14, L. E. Jones, '11, W. E. Lockhart, '15, C. E. MacDonald, '16, F. D. Austin, '15, J. M. Strathy, '13, A. W. Crawford, '14.

Harold Campbell, B.A. Sc., '14, and J. G. Scott, B.A. Sc., '14, are at St. Catharines, Ont., employed on mechanical design for the construction of the Welland ship canal.

C. H. Eckert, B.A. Sc., '11, is in charge of laboratory work at nights for the Dominion Sugar Company, Limited, Wallaceburg, Ont., for the present beet season.

G. B. MacAuley, '14, who was in California when war was declared, sailed at once for England and enlisted with a regiment of British cavalry. He has been at the front now for some time.

W. T. Curtis, B.A. Sc., '13, formerly with the Dominion Reduction Co. at Cobalt, is now with the Hollinger Mine, Porcupine, Ont.

K. H. Smith, '11, engineer in charge of Canadian Water Power Exhibit at Panama-Pacific Exposition, San Francisco, is temporarily located in Toronto.

C. W. Cornell, '11, of the firm of Jones-Cornell Construction Co., Limited, of New Westminster, B.C., is on a short visit to points in Ontario.

K. A. MacKenzie, B.A. Sc., '06, formerly secretary of the University of Toronto Engineering Society, is in Toronto at present. He will likely remain here for the winter, after which he will return to British Columbia, where he has been located during the last few years.

S. A. Hustwitz, B.A. Sc., '14, is engaged on work on section 2, Welland ship canal, Homer, Ont.

J. A. Yarker, '11, is on the business staff of the "Saturday Sunset," Vancouver, B.C. He is on a visit to Toronto at present.

In the Alumni Directory of the October issue of "Applied Science" it was incorrectly stated that Mr. K. G. Ross, '06, is with Lang & Keys, Saut Ste. Marie, Ont. Mr. Ross has for the last three years been a member of the firm Lang & Ross (J. L. Lang, '06), engineers and surveyors, Sault Ste. Marie, Ont.

D. G. Ferguson, B.A. Sc., '14, is on the engineering staff of the Hydro-Electric Power Commission of Ontario, Continental Life Building, Toronto.

H. S. Clark, '10, is engaged on work on Section 2, Welland Ship Canal, at Homer, Ont.

I. R. Strome, B.A.Sc., '14, is in the irrigation office, Department of Interior, at Calgary, Alta. He is at present of the staff employed on the re-classification of C.P.R. irrigated lands.

C. I. Grierson, B.A.Sc., '14, is employed as electrical engineer for the Wabamun Power and Coal Company, Edmonton, Alta.

Capt. L. E. Jones, '11, was in Toronto for a few days recently. He will accompany the Second Contingent to Europe with the Western Ontario Division, and is now in camp at London, Ont.

A. W. Crawford, B.A.Sc., '14, will accompany the Second Contingent to Europe, as corporal, 2nd Field Company, Canadian Engineers.

## DIRECTORY OF THE ALUMNI

Silvester, G. E., '91, is chief engineer for the Canadian Copper Co., at Copper Cliff, Ont.

Sims, F. R., '13, is appraiser, Department of Customs, Ottawa, Ont.

Sinclair, D., '02, deceased.

Sinclair, D. G., '13, is with the Canadian Co., Copper Cliff, Ont.

Sisson, C. E., '05, is with the Canadian General Electric Co. at Peterboro, Ont., as transformer, estimating, designing and supervising engineer.

Slater, F. W., '04, is with the General Electric Co. at Schenectady, N.Y., as commercial engineer in the Turbine Sales Department.

Smallpiece, F. C., '98, is with the General Supplies Co., Calgary, Alta., as chief engineer and assistant manager.

Smart, R. S., '04, is manager of Featherstonhaugh & Co., patent solicitors and engineers, Ottawa, Ont.

Smiley, R. W., '97, address not known.

Smith, A. N., '92, is engineer for Wm. B. Pollock & Co., Youngstown, Ohio.

Smith, A., '94, is city engineer, North Vancouver, B.C.

Smith, H. G., '03, deceased.

Smith, Alex. H., '00, is manager of the Teck-Hughes Mine, Swastika, Ont.

Smith, R. W., '98, has a surveying practice at Revelstoke, B.C.

Smith, J. H., '03, address not known.

Smith, D. A., '04, is a member of the firm Smith & Phillips, civil engineers, and land surveyors, 1855 Scarth St., Regina.

Smith, K. H., '11, is with the Water Power Branch, Department of Interior, Ottawa, Ont.

Smith, M. L., '11, is associate editor with the Maclean Publishing Co., 143 University Ave., Toronto.

Smith, W. C., '10, is in the city engineer's office at Victoria, B.C.

Smith, G. E., '10, took a post-graduate course in Analytical and Applied Chemistry at the "School" last year. We believe he is at Bozeman, Montana, now.

Smith, F. L., '10, is superintendent of the Queen Victoria Mine, Nelson, B.C.

Smith, F. R., '07. Address not known.

Smither, W. J., '04, is demonstrator in drawing at the University of Toronto.

Smithrim, E. R., '07, is at Strathroy, Ont.

Snaith, W., '07, is secretary-treasurer and engineer of the Thor Iron Works, Ltd., Toronto, Ont. He is also secretary-treasurer of the Canada Cement and Concrete Association.

Sneath, R. G., '11, is engaged on the Welland Canal survey at Thorold, Ont.

Sparling, M., W., '09, is with the Seymour Power & Electric Co., Ltd., Campbellford, Ont.

Speller, F. N., '93, is metallurgical engineer for the National Tube Co., Pittsburg, Penn.

Spellman, W. A., '13, is in Hastings, Ont.

Spence, J. J., '08, is with the Sovereign Construction Co. Ltd., Lumsden Building, Toronto.

Spencer, A. C., '07, is mechanical engineer for the Hamilton Stove & Heater Co., Hamilton, Ont.

Spotton, A. K., '94, is chief engineer for Goldie & McCulloch Engine Works, Galt, Ont.

Spry, R. J., '10, is, we understand, in London, Ont., at present.

Squire, G. E., '11. We do not know how he is engaged at present.

Squire, R. H., '93, deceased.

Stamford, W. L., '08, was on the engineering staff of the Hydro Electric Power Co. at Pointe Du Bois, Man., when last heard from.

Starr, R. H., '08, is estimating engineer for the Toronto Hydro Electric system. His address is 670 Indian Rd., Toronto.

Stayner, D. S., '09, of 201 Heath St., W., Toronto, is resident engineer for the Harbor Commission, Toronto.

Steele, I. J., '02, is in the topographical surveys branch of the Department of Interior at Ottawa, Ont.

Steele, A. L., '10, is demonstrator in mining engineering, University of Toronto.

Steele, W. S., '11, is with the Brooklyn Rapid Transit Co., Brooklyn, N.Y.

Stern, E. W., '84, is consulting engineer at 101 Park Avenue, New York, N.Y.

Steven, H. M., '10, is mining engineer for the Canadian Mining and Finance Co., Timmins, Ont.

Stevenson, W. H., '01, address not known.

Stewart, A. E., '11, is in Toronto at present.



Stewart, J. A., '98, is engineer and contractor, 67 Federal Life Bldg., Hamilton, Ont.

Stewart, D. L. N., '05. We understand that he has been at Fort Francis, Ont., during the summer, with the Department of Lands, Forests and Mines.

Stewart, M. A., '05, is assistant engineer in the roadway department at the City Hall, Toronto.

Stewart, R. O., '11, is in the bridge department of the I. R. Co. at Moncton, N.B.

Stewart, W. M., '06, is a member of the firm Phillips, Stewart & Lee, engineers and surveyors, Saskatoon, Sask.

Stewart, G. S., '07, is sales engineer for the Toronto General Electric Co., Toronto.

Stewart, A. W. J., '08, is assistant engineer of the Hydro-Electric system, 226 Yonge St., Toronto.

Stewart, N. C., '09, is at Nelson, B.C.

Stiles, J. A., '07, is professor of civil engineering at University of New Brunswick, Fredericton, N.B.

Stirret, G. P., '08, was resident engineer for C. N. P. Ry., at Henningville, B.C., when last heard from.

Stiver, J. L., '07, is inspector of gas and electricity with the Department of Inland Revenue, Toronto, Ont.

St. Lawrence, J., '08, is superintendent of engine shops, Erie City Iron Works, Erie, Pa.

Stock, J. J., '08, is Dominion Land Survey contractor in the Edmonton district. His address is 448 Cooper St., Ottawa.

Stock, P. H., '09, is assistant engineer for the N. St. C. & T. R. railway. His address is 26 Chestnut St., St. Catharines, Ont.

Stocking, F. T., '95, of 74 Kendal Ave., Toronto, is with the Hydro Electric Commission.

Stone, L. I., '10, is resident engineer for the G. T. Railway at London, Ont.

Story, R. A., '11, is on the engineering staff of the B.C. Telephone Co., Vancouver, B.C.

Strathy, J. M., '13, is corporal with the 2nd Field Company, 2nd contingent Canadian engineers.

Street, J. C., '09, is in charge of survey of the Welland Ship Canal. Address is, care of Welland Ship Canal, St. Catharines.

Stroud, S., '09, is sales engineer for

the Canadian Westinghouse at Toronto, Ont.

Stuart, H. B., '08, is designer and estimator for the Hamilton Bridge Works Co. Ltd., Hamilton, Ont.

Stuart, J. L. G., '07, '08, has been on an extended trip through Europe during the summer. We do not know how he has been engaged since his return.

Stubbs, W. F., '05, is assistant engineer for Goldie & McCulloch Co., Galt, Ont.

Stull, W. W., '97, is surveyor and mining engineer at Sudbury, Ont.

Sturdy, N. H., '05, is engineer for the Trussed Concrete Steel Co., at Youngstown, Ohio.

Summers, G. F., '07, is a member of the firm Routley & Summers, Ontario land surveyors and contractors, Haileybury, Ont.

Sutcliffe, H. W., '07, is a member of the firm Sutcliffe & Neelands, engineers and surveyors, New Liskeard and Cochrane.

Sutherland, A. L., '10. His last address on our fyle is 87 Cowan Ave., Toronto.

Sutherland, W. H., '02, is assistant engineer for the Montreal Water & Power Co. His address is 384 Grosvenor Ave., Westmount, Que.

Sutherland, C. C., '09, is assistant roadways engineer on the city engineering staff, Edmonton, Alta.

Sutherland, D., '13, is in the roadways department, City Hall, Toronto.

Swan, W. G., '05, formerly division engineer for the Canadian Northern Railway at New Westminster, B.C., is now with the artillery at Duncan's, Vancouver Island, B.C.

Swan, R. G., '09, is chief engineer of the British Columbia Hydrographic survey, New Westminster, B.C.

Sword, A. D., '08, '09, is concrete designer for Clarence W. Noble, concrete reinforcement and fire-proofing specialties, Home Life Building, Toronto.

Sykes, F. H., '05, is chief plan examiner in the city architect's department at the City Hall, Toronto, Ont.

Symmes, H. D., '91, has a practice as engineer and contractor at Niagara Falls S., Ont.

Sylvester, K. B., '10, is with the Sylvester Mfg. Co. at Lindsay Ont.

Szamers, C. F., '11, of 10 Callender St., Toronto, is with Sherwood & Sherwood, contractors, Toronto.



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